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(71) Applicant: Mitsubishi Heavy Ind. Ltd.

(72) Inventor: Fumio WADA

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(54) [Title of the Invention] Pressing Roll used in Winder

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(57) [Abstract]

[Purpose] To provide a pressing roll, by which a film can be taken up while the film is pulled outward in the widthwise direction thereof and an unevenness of the film wound around a winding core is absorbed.

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[Constitution] A circular tubes 120 which are freely deformed and have flexibility are arranged side by side in the direction of the shaft center and wound around the outer periphery of a roll 100 to form tube aggregates 113a, 113b, and in the tube aggregates, the tubes 120 are wound in such a manner as to be inclined to the middle position as it directs in the rotating direction of the roll, with the middle position B in the shaft center direction

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in the tube aggregates as the boundary, so that the tensile force outward in the widthwise direction is applied to a film. Further, a pressure medium is supplied into the tubes 120 through a through hole 109 provided in the axial direction of the roll.

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[Claims]

[Claim 1] A pressing roll used in a winder, characterized in that the pressing roll comprises a roll and a circular tube which is freely deformable and flexible, that the tube is wound around the  
10 outer periphery of the roll in the circumferential direction thereof and is arranged side by side in the direction of the shaft center to form a tube aggregate and an unevenness formed with the arranged tubes and circumferential grooves formed between the arranged tubes, that in the tube aggregate, the tube is wound  
15 around the outer periphery of the roll with an inclination toward the middle position of the tube aggregate in the direction of the shaft center as it directs in the rotating direction of the roll, that a through hole is bored in the roll in the axial direction thereof to provide a pressure medium, and that the end of the tube  
20 communicates with the through hole.

[Detailed Description of the Invention]

[0001]

[Industrial Application] The present invention relates to a pressing roll used in a winder.

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[0002]

[Prior Art] It is generally known that it is effective to press

a film product with a pressing roll during winding of a film for preventing stray of a film and taking up a film in a form of a roll having a suitable hardness.

[0003] A pressing roll has a structure generally shown, for example, in Fig. 4 or Fig. 5. A pressing roll 1 shown in Fig. 4 comprises a shell 2 supported on and being free to rotate about a penetrated shaft 4 through bearings 3 at both end portions of the shell. A pressing roll 5 shown in Fig. 5 comprises a shell 6 and shafts 7 protruded from both end portions of the shell respectively. The respective shafts are supported on and are free to rotate about respective pressing arms or the like of the pressing roll through respective bearings 8. In the pressing rolls in either type, a force is applied from the shafts 4, 7 of the pressing rolls 1, 5 in taking-up and the surfaces of the pressing rolls 1, 5 are pressed on a product roll being winding with a suitable pressing force. As a result, a straying of a film on the product roll is prevented as well as a winding hardness of the product roll is adjusted by adjusting the pressing force.

[0004] On the other hand, rolls shown in Figs. 6, 7 and 8 are known as carrying rolls for carrying a wrapping film. A resin wire (for example, urethane resin wire) 51 having a circular cross section is wound on the periphery of a roll 3 at almost all length between both ends of the roll in peripheral direction and the wire is arranged in side by side in the direction of the shaft center. An aggregate formed with the arranged wires 51An has unevenness formed with each of the arranged wires 51 and peripheral grooves

53 formed between the adjacent wires. The aggregate of wires 51 is separated into an aggregate 52a in one side and an aggregate 52b in the other side in the direction of the shaft center with the middle position B of the aggregate. Each of wires 51 in each  
5 of the aggregates is inclined to the middle position B along the direction of the shaft center as it directs in the rotating direction of the roll 3. That is, the inclination directions of the wires 51 in the aggregates 52a, 52b on both sides are in reverse each other at the middle position B as a border. Each of wires  
10 in both aggregates 52a, 52b is formed with a continuous material which is wound in touch with next to next. Both end portions 51a of the material are fixed on the internal surface of the roll 3 respectively.

[0005]

15 [Problem(s) to be solved by the invention] For winding a film, it is necessary to wind a film in a roll in keeping with a suitable hardness. In the conventional pressing rolls shown in Figs. 4 and 5, it is impossible to wind a film in stretching the film in the widthwise direction, and it is difficult to wind the film in  
20 a form in complete round. On the other hand, where the rolls shown in Figs. 6, 7 and 8 are used respectively as a pressing roll in a winder, it is possible to wind a film traveling in the direction showing the arrow A in Fig. 6 under stretching the film in the widthwise direction. However, if an unevenness was occurred on  
25 a film wound on a winding core, there is a case where the pressing roll jumps and the unevenness is amplified. Such the state also

happens in the pressing rolls shown in Figs. 4 and 5.

[0006] Then, the invention tends to provide a pressing roll which cancels the above inconvenience.

[0007]

5 [Means for Solving the Problem] A pressing roll used in a winder of the invention is characterized in that the pressing roll comprises a roll and circular tube which is freely deformable and flexible, that the tube is wound around the outer periphery of the roll in the circumferential direction thereof and is arranged  
10 side by side in the direction of the shaft center to form a tube aggregate and an unevenness formed with the arranged tubes and circumferential grooves formed between the arranged tubes, that in the tube aggregate, the tube is wound around the outer periphery of the roll with an inclination toward the middle position of the  
15 tube aggregate in the direction of the shaft center as it directs in the rotating direction of the roll, that a through hole is bored in the roll in the axial direction thereof to provide a pressure medium, and that the end of the tube communicates with the through hole.

20 [0008]

[Function] An expanding pressure is acted in the circular tube which is wound around the periphery of the roll and is freely deformable and flexible by the pressure medium supplied into the tube through the through hole, and an unevenness formed on a film  
25 winding on a winding core can be absorbed by the tube. Therefore, the pressing roll touching with the unevenness of the film wound

on the winding core does not jump in order to absorb the unevenness unlike the conventional pressing roll. Further, the tube is wound around the roll in both sides on the middle position in the direction of the shaft center with the inclination to the middle position as directing the rotating direction of the roll, and the film can be wound under stretch acting in the widthwise direction of the film. As a result, it is possible to take up a film in the form of roll which has a nearly complete circle.

[0009]

10 [Example] An embodiment of the invention is described with reference to Figs. 1, 2 and 3. Fig. 1 is the front view of a pressing roll in the embodiment. Fig. 2 is a cross-sectional view taken along line A-A of Fig. 1. Fig. 3 is a side view of a winding apparatus as a whole in which the pressing roll in the embodiment is used. In Fig. 3, 104 and 105 are guide rolls guiding a film F respectively, 100 is a pressing roll, 130 is a winding core, and 102 is a milled roll of the film F wound on the winding core 130.

[0010] The pressing roll 100, as shown in Figs. 1 and 2, has a shafts 107 which are projected from both end portions of a shaft core 106 respectively. The shafts 107 are supported with arms supporting the pressing roll through bearings 103 respectively. A through hole 109, explained later, into which the end portion 116 of the tube is inserted, is provided in the shaft core 106 and the shaft 107 in the axial direction thereof. The through hole is connected to a swivel joint 110 provided at an end portion

of the roll 100. The swivel joint 110 is connected to a medium controller 111 via a tube 112. The medium controller 111 feeds a pressure medium, such as air, an oil, water, etc., into a tube, explained later, wound around the outer periphery of the shaft  
5 core 106 and keeps the tube at a predetermined pressure.

[0011] A circular tube 120 made of rubber, resin, etc. which is freely deformable and has flexibility is wound around the outer periphery of the shaft core 106 in the circumferential direction and arranged side by side in the direction of the shaft center.  
10 An aggregate of the tube 120 has an unevenness formed with each of the arranged tubes and circumferential grooves formed between the arranged tubes. The aggregate of the tube 120 is separated into an aggregate 113a in one side and an aggregate 113b in the other side in the direction of the shaft center with the middle  
15 position B of the aggregate. Each of the arranged tubes of the tube 120 in each of the aggregates is inclined to the middle position B along the direction of the shaft center as it directs in the rotating direction of the shaft core 106 at the contacting line with the film. That is, inclination directions of the tubes  
20 120 in the aggregates 113a, 113b on both sides are in reverse each other at the middle position B as a border. Each of tubes 120 in both aggregates 113a, 113b is formed with a single material which is wound in touch with next to next. The end portion 116 of the tube 120 is inserted into the through hole 109 to communicate  
25 therewith.

[0012] An expansion pressure of the tube 120 wound around the

pressing roll 100 having the before-mentioned construction is controlled by a supplying pressure of the pressure medium (air, an oil, water, etc.) supplied from the medium controller 111. A film is taken-up on a winding core 130 (refer to Fig. 3), being  
5 pressed with the pressing roll 100 provided with the tube 120 which is expanded by the internal pressure. Unevenness occurred on a film wound around the winding core is flexibly treated as the tube 120 of the pressing roll is expanded by the pressure medium as mentioned above, unlike the elasticity of the conventional rubber,  
10 etc. That is, vibration of the unevenness is absorbed easily. By this, the pressing roll 100 itself does not jump up, or vibration amplification is not carried out. As explained in the above, the film can be taken-up under stretch acting in the direction toward outside, since the tube 120 is wound on the pressing roll with  
15 the inclination toward the middle position B in the direction of the shaft center.

[0013]

[Effect of the Invention] In the pressing roll of the invention, a circular tube being freely deformable and having flexibility  
20 is wound around the periphery of the roll, and the wound tube is inclined toward the middle position in the direction of the shaft center as directing the rotating direction of the roll, and further a pressured medium is provided into the tube. Therefore, a film can be taken-up while the film is stretched in the outside  
25 direction in the width of the film and an unevenness of the film wound around a winding core can be absorbed by deformation of the



tube. By this, a film can be easily rolled round in the form nearer to a complete circle.

[Brief Description of the Drawings]

Fig. 1 is a front view of an embodiment of the pressing roll  
5 of the invention.

Fig. 2 is a cross sectional view taken in the line A-A of Fig.  
1.

Fig. 3 is a whole side view of a winding apparatus in which  
the embodiment of the pressing roll is used.

10 Fig. 4 is a cross sectional view of a conventional pressing  
roll.

Fig. 5 is a cross sectional view of a conventional pressing  
roll.

Fig. 6 is a partial front view of a conventional carrying roll  
15 for a packaging film.

Fig. 7 is a cross sectional view taken in the line X-X of Fig.  
6.

Fig. 8 is a cross sectional view taken in the line Y-Y of Fig.  
7.

20 [Description of Symbols]

100	pressing roll
103	bearing
106	shaft center
107	shaft
25 109	through hole
110	swivel joint

111 medium controller  
113a, 113b aggregates of a tube  
116 the end of a tube  
120 tube